Abstract

A sensor fusion system is described that simultaneously acquires at least two images respectively in a subspectrum of the visible/NIR/SWIR (0.4-2.0 micron) reflective spectrum and in a subspectrum of the thermal infrared (3.0-15 micron) spectral regions using respective sensing arrays viewing a common aperture. In a common aperture system although radiation is sensed by separate focal plane arrays radiation enters at the front-end of a commonly shared focusing optical system so that all sensed radiation originates along exactly the same optical path and then is directed to each sensing plane. This is as opposed to a boresighted sensor system whereby radiation sensed by focal plane arrays either travels along completely different optical paths or is focused by different optical elements. The advantage of using a common aperture system is precise co-registration of reflective and thermal infrared imagery irregardless of the depth-of-field range of the scene being imaged. This enables the precise integration of image fusion processing and algorithms into such a system that can fully exploit the complementary properties of reflected and thermally emitted radiation from a scene. Such image fusion can present visualizations to a human observer providing augmented visual cues and situational awareness, or, key information to an automated image understanding system. Such an integrated system can be made into a small but powerful helmet-mounted, hand-held or rifle sight or can be used by

automated image understanding systems to perform surveillance, detection, tracking, navigation, driver vision enhancement, automatic target or biometric (e.g., face) recognition.